

IN THE CLAIMS:

Please amend the claims as follows:

1. (Currently Amended) A three dimensional model re-parameterization computer system comprising:

a re-parameterization process, recorded on a computer readable medium, that re-parameterizes one or more Catmull-Clark models to create a re-parameterized model, each of the Catmull-Clark models having one or more extraordinary vertices and one or more adjacent iso-parameter lines that have a natural spacing that changes, the re-parameterized model having iso-parameter lines with a new spacing that is different than the natural spacing as the lines approach the extraordinary vertex.

2. (Currently Amended) A three dimensional model re-parameterization computer system comprising:

one or more Catmull-Clark models, recorded on a computer readable medium, each of the models having one or more surfaces and one or more extraordinary vertices, where one or more adjacent iso-parameter lines have a natural spacing between them that changes as the iso-parameter lines approach the extraordinary vertex; and

a re-parameterization process, recorded on the computer readable medium, that re-parameterizes the model so that one or more of the extraordinary vertices have adjacent iso-parameter lines with a new spacing that is different than the natural spacing as the lines approach the extraordinary vertex.

3. (Previously Presented) A system, as in claim 1, where derivatives evaluated at one or more parameter values of one or more limit surfaces of subdivision of the Catmull-Clark model approach zero as one or more parameter positions approach the extraordinary vertex.

4. (Previously Presented) A system, as in claim 1, where derivatives evaluated at one or more parameter values of a limit surface of subdivision of the Catmull-Clark model approach an

actual derivative of the limit surface at the extraordinary point as one or more parameter positions approach the extraordinary vertex.

5. (Original) A system, as in claim 1, where the new spacing decreases as the iso-parameter lines approach one or more of the extraordinary vertices.

6. (Original) A method, as in claim 1, where the new spacing is uniform as the iso-parameter lines approach one or more of the extraordinary vertices.

7. (Currently Amended) A method for surface re-parameterization of a surface around extraordinary vertices of a computer three-dimensional Catmull-Clark model with a plurality of vertices, at least one extraordinary vertex, and iso-parameter lines with a natural spacing, the method comprising the step of:

re-parameterizing one or more subdivision surfaces of the Catmull-Clark model around one or more of the extraordinary vertices into a re-parameterized surface with a new spacing that is different than the natural spacing as the iso-parameter lines approach the extraordinary vertex; and

at least one of storing the iso-parameter lines with the new spacing and displaying the iso-parameter lines with the new spacing.

8. (Original) A method, as in claim 7, further comprising the step of evaluating the re-parameterized surface at one or more parameter positions.

9. (Original) A method, as in claim 7, where the re-parameterizing comprises the following steps:

computing four subdominant eigenvalues corresponding to each of the vertices of a face, being face vertices, of a quadrilateral mesh containing one or more points being evaluated;

re-parameterizing the surface around each of the face vertices using a re-parameterization of vanishing derivatives, such that

$x \xrightarrow{F_k} |x|^{\alpha_k - 1} x$, where k identifies the face vertex and x is the point being evaluated

in a parameter domain, and the re-parameterization is subject to the constraint

$$\alpha_k > -\frac{\log 2}{\log \lambda_k}$$

where λ_k is the subdominant eigenvalue corresponding to face vertex k and α_k is an exponent parameter of the re-parameterization for the respective face vertex; and blending the re-parameterizations of each face vertex that is re-parameterized.

10. (Original) A method, as in claim 7, where the re-parameterizing comprises the following steps:

- computing a characteristic map corresponding to each of the vertices of a face, being face vertices, of a quadrilateral mesh containing one or more points being evaluated;
- computing an inverse characteristic map for each of the face vertices; and
- blending the inverse characteristic maps of the four face vertices to create the re-parameterization.

11. (Original) A method, as in claim 10, where the characteristic map is used to obtain a continuously differentiable parameterization around one or more of the extraordinary vertices.

12. (Previously Presented) A method, as in claim 10, where the inverse characteristic map is computed by locating a layer on the surface and a polynomial patch within that layer that contains the point to be evaluated and then computing a re-parameterized position of the input point by polynomial patch inversion.

13. (Original) A method, as in claim 7, where the blending is a blending of the re-parameterizations of two or more extraordinary vertices.

14. (Original) A method, as in claim 7, where the new spacing decreases as the iso-parameter lines approach one or more of the extraordinary vertices.

15. (Original) A method, as in claim 7, where the new spacing is uniform as the iso-parameter lines approach one or more of the extraordinary vertices.

16. (Currently Amended) A system for surface re-parameterization of a surface around extraordinary vertices of a computer three-dimensional Catmull-Clark model comprising:

means for re-parameterizing of one or more subdivision surfaces of the Catmull-Clark model with a plurality of vertices and at least one extraordinary and that has iso-parameter lines with spacing that is different than an original natural spacing, as the iso-parameter lines approach the vertex; and

at least one of memory means for storing the iso-parameter lines with the new spacing and display means for displaying the iso-parameter lines with the new spacing.

17. (Currently Amended) A computer program product comprising a computer useable medium having computer readable program code embodied therein for surface re-parameterization of a surface around extraordinary vertices of a computer three dimensional Catmull-Clark model, ~~the computer program product having a method stored on one or more computer memory medium; the method~~ computer program product comprising the step of:

program code for re-parameterizing of one or more subdivision surfaces of the Catmull-Clark model with a plurality of vertices and at least one extraordinary and that has iso-parameter lines with spacing that is different than an original natural spacing, as the iso-parameter lines approach the vertex.